

# Multiple brain and pulmonary abscesses due to *Streptomyces spp.* in a patient with silicosis

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**ABSTRACT:** Invasive *Streptomyces* infections are rarely described in the scientific literature, thus we report a case of multiple brain and pulmonary abscesses in a silicosis affected young man successfully treated with intravenous antibiotic therapy.

— **Keywords:** Brain and lung abscess, *Streptomyces*, Pneumoconiosis; antibiotic treatment.

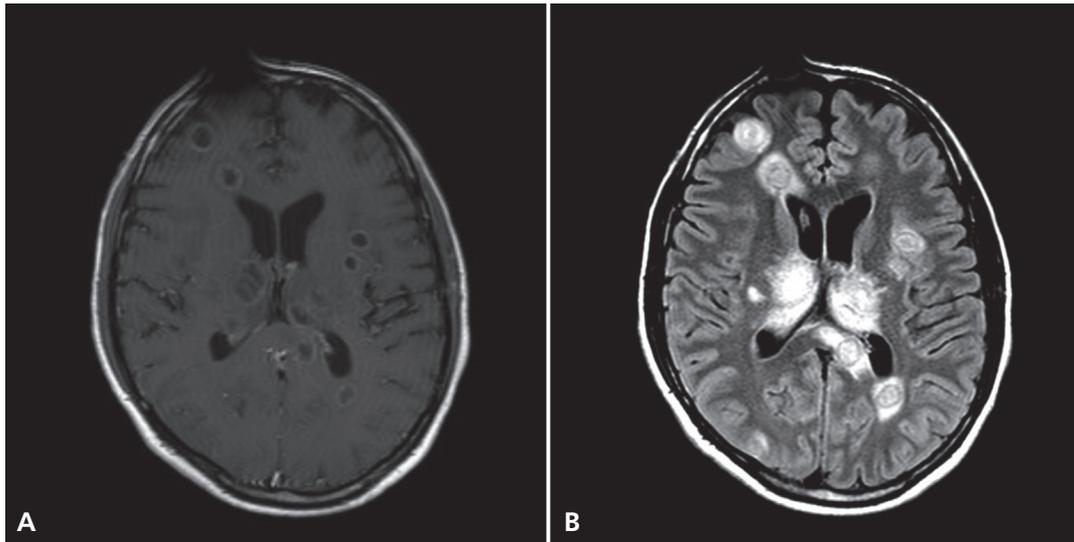
## INTRODUCTION

*Streptomyces* are Gram-positive saprophytic soil bacteria rarely known as cause of invasive infections; malignancy, AIDS/HIV, central catheter, and prosthetic valve are the major risk factors<sup>1</sup>. Among cases reported in the literature we found bloodstream infections<sup>2-5</sup>, pneumonia<sup>6,7</sup> and central nervous system infections<sup>8,9</sup>.

## CASE REPORT

A 45 years old man, previous miner and with a history of alcoholism was admitted to a Respiratory Diseases Unit in October 2017 due to a respiratory failure. The chest X-ray revealed a right basal lung consolidation. A bronchoscopy was performed and *Actinomyces* colonies were identified in cultural test of broncho-alveolar lavage. The histologic examination revealed a silicosis like pattern: small hyaline nodular areas made of cellular debris and small crystals surrounded by histiocytes, plasma cells and lymphocytes were described. The Ziehl-Neelsen stain excluded the hypothesis of an infection sustained by *Mycobacteria*. Although oral amoxicillin/clavulanate (1 g every 12 hours) therapy was started, the patient didn't present to the following medical examinations. Six months later the patient came to the Emergency Room of a peripheral hospital because of stupor. His relatives told the physicians that he referred fever and headache since few days, later

he was found in a mental confusion state. The lumbar puncture results of a high level of proteins and neutrophilic lymphocytes. The cranial computed tomography (CT) revealed the presence of multiple, small, round-shaped lesions compatible with micro-abscesses. The chest X-ray showed disseminated nodular lesions and a parenchymal consolidation in mid-lower fields of both lungs. After few hours of observation the patient was sent to our ward of Infectious Diseases for further investigations. On arrival GCS score was 10. On physical examination, no rigor nuchalis nor focal neurological signs but only fine tremors involving the right arm were observed. The lung examination revealed decreased breath sounds, rhonchi and crackles on chest auscultation. He also presented a deep scar in the forehead due to a work-related injury. Blood test results showed an increase of CRP (15.6 mg/dL) and neutrophilic leucocytes. Intravenous (iv) meropenem (2 g every 8 hours, iv) plus iv levofloxacin (500 mg every 12 hours) and dexametasone (36 mg/day, iv) were started. After 48 hours there was no clinical improvement and a neurological consultation was performed. The patient was unresponsive to verbal stimulation, with a prominent rigidity to upper and lower limbs. Positive Babinski sign was present to both sides. A brain MRI showed the presence of multiple target-shaped lesions surrounded by thin edema, disseminated in both supratentorial and infratentorial territories (Figure 1).



**Figure 1.** *A*, Brain Magnetic Resonance Imaging (MRI) FLAIR sequence. *B*, Contrast-enhanced T1-weighted brain MRI. Multiple round lesions with peripheral edema are present bilaterally in the centrum semiovale, in the periventricular and subcortical white matter, especially the thalamus and right posteroinferior temporal lobe. Few similar lesions are also seen in the left splenium of corpus callosum and the left cerebellar hemisphere. Some lesions cause the narrowing of both the middle portion of lateral ventricles and the third ventricle without a clear hydrocephalus. Findings on diffusion and contrast-enhanced scans are consistent with a condition of brain abscesses. Metal artifacts in the right frontal region are also reported.

The electroencephalogram showed a teta-delta activity in both hemispheres and electrical signs of brain suffering. The neurosurgery consultant excluded the possibility of a stereotactic biopsy because the diameter of the lesions was lower than 2 cm. A conservative treatment was suggested. Meanwhile, the presence of abscesses in the abdomen was excluded by a total body CT scan that showed huge consolidative areas in the lower field of both lungs. No vegetation was observed on the transesophageal echocardiography. Serological testing for HIV infection was negative. A new bronchoscopy with broncho-alveolar lavage was performed but the cultural tests were negative. Therefore, we decided to perform a CT-guided biopsy of the huge consolidative area located in the basis of the right lung. *Streptomyces spp.* was isolated in cultural tests but no species were identified. Antibiotic susceptibility tests suggested a sensibility to penicillin, fluoroquinolones, carbapenems and rifampin and resistance to metronidazole and vancomycin. Levofloxacin was switched to iv Linezolid (600 mg every 12 hours) and after 10 days meropenem was stopped. Dexamethasone was gradually reduced and then stopped, but after that, the patient showed a quick worsening of clinical conditions. Dexamethasone was reintroduced and iv amoxicillin/clavulanate (2,2 g every 6 hours) was associated to linezolid. One week later the patient started to show a gradual clinical improvement, until a complete recovery. A new brain MRI performed a month later revealed a decrease in number and volume of the abscess; therefore, antibiotic therapy was simplified to iv. ceftriaxone (2 g every 12 hours). At discharge, after two months of intravenous therapy, the patient was transferred to a long-term care ward where continued iv ceftriaxone (2 g every 12 hours) treatment because of a persistence of small lesions in the last brain MRI. After 2 more weeks he was switched to oral antibiotics and discharged.

## DISCUSSION

A few cases of *Streptomyces* brain abscesses are described in the literature<sup>8,9</sup>. This is the first case of lung and brain involvement, as far as we know. Published susceptibility data indicate full activity of amikacin and linezolid against these pathogens; carbapenems, tetracyclines, and macrolides may also have utility<sup>9</sup>. While sulfonamide are traditionally used for treating *Nocardia* species infection, only 35% of *Streptomyces* isolates are susceptible to trimethoprim-sulphamethoxazole (TMP-SMX)<sup>9</sup>. In our case the antibiotic therapy was decided according to antibiotic susceptibility tests and considering both brain and lungs clinical involving. Unfortunately, it was not possible to perform a brain stereotaxic biopsy, which is considered the gold standard in brain abscesses diagnosis.

## CONCLUSIONS

Clinical and laboratory response were successful despite the persistence of few small lesions. Although invasive streptomyces infections are rarely observed, they must be ruled out in the differential diagnosis of lung and brain abscesses.

## CONFLICT OF INTEREST:

The Authors declare that they have no conflict of interests.

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